Appendix – Oil prices and inflation: Is Australia facing a crude shock?

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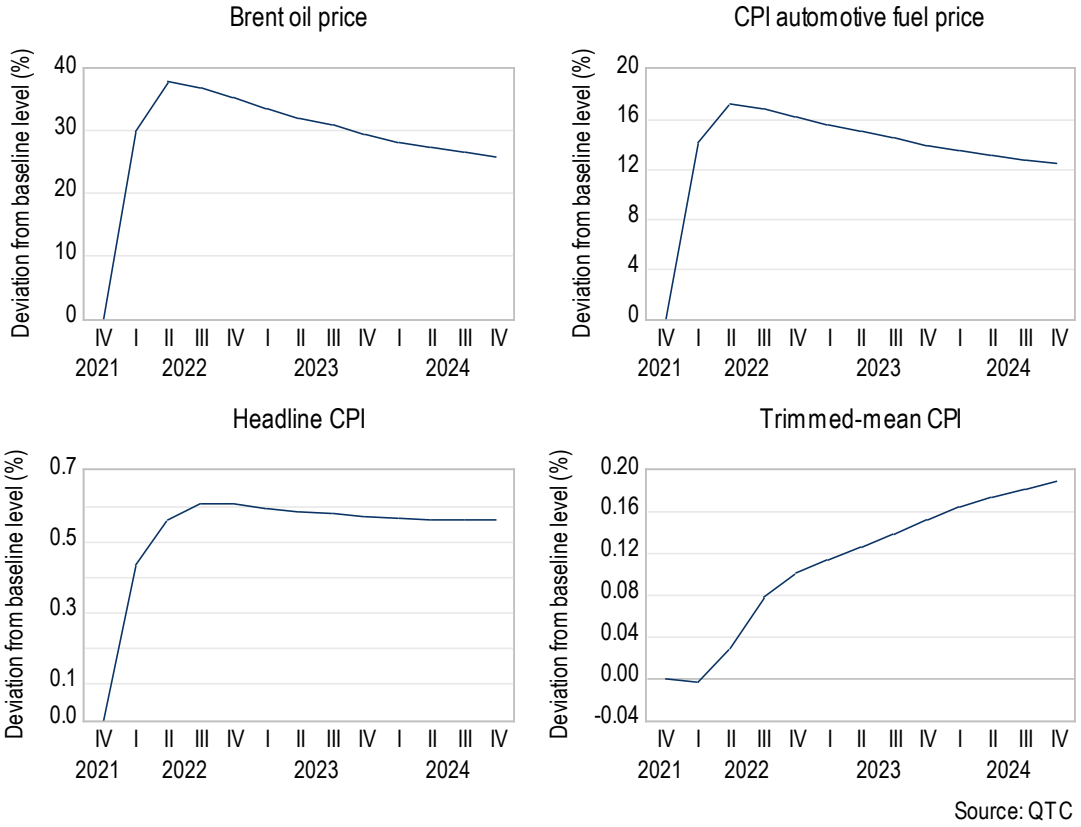
This appendix provides a description of the assumptions and methodology underlying the estimates described in Saunders (2022).

Summary of price and inflation expectations responses to oil price changes

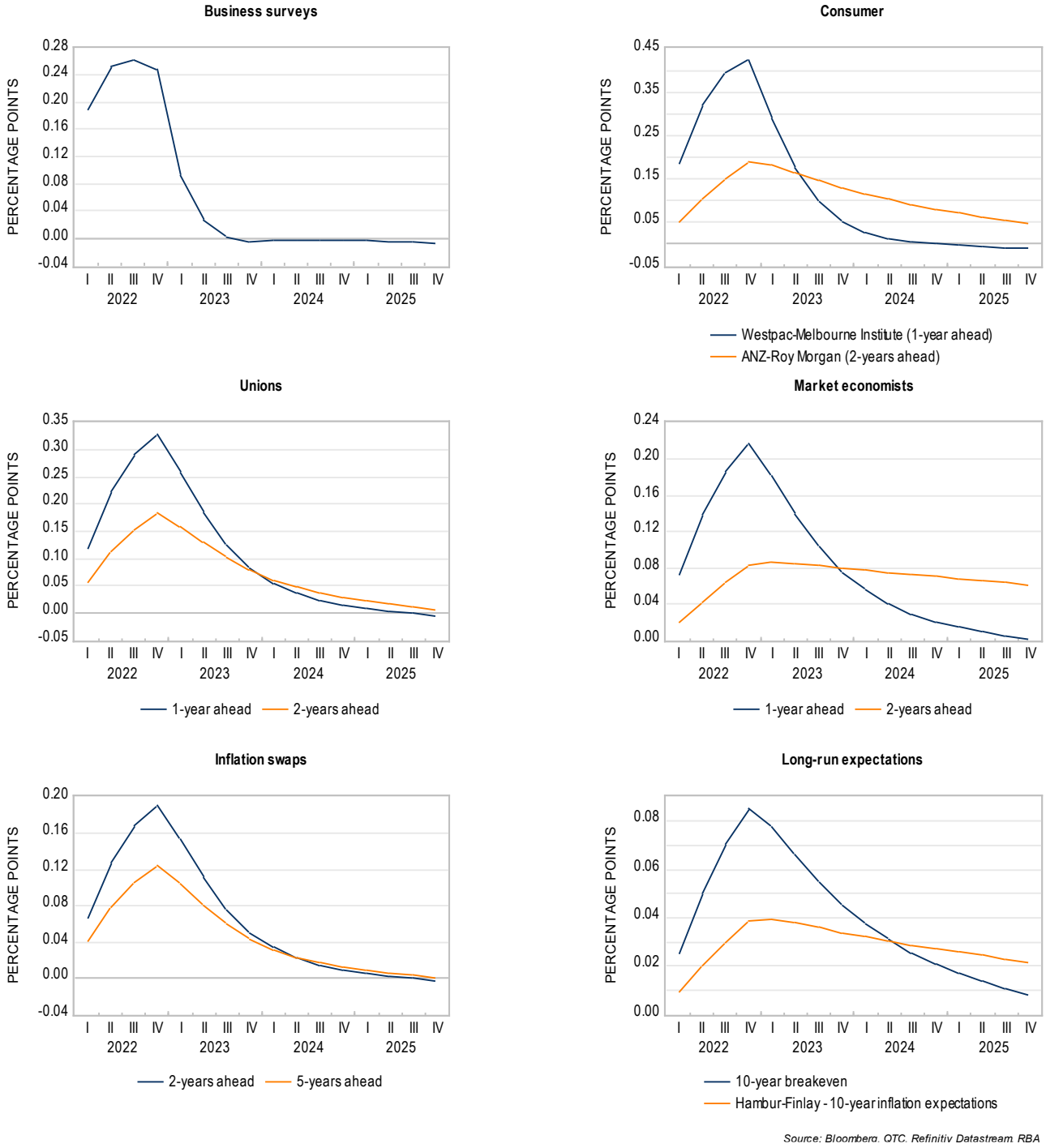
The estimates of the impact of higher crude oil prices in the article are based on the change in the markets outlook for Brent crude oil prices since the end of 2021. Over this period, the markets outlook for crude oil prices has increased by around 30 to 40 per cent. The key responses to this change in the outlook for oil prices are shown in Graphs A1 (prices) and A2 (inflation expectations).

GRAPH A1: RESPONSES TO THE HIGHER OUTLOOK FOR CRUDE OIL PRICES



Source: QTC

GRAPH A2: RESPONSE OF INFLATION EXPECTATIONS TO HIGHER CRUDE OIL PRICES



Source: Bloomberg, QTC, Refinitiv Datastream, RBA

Pass through to underlying inflation

In order to evaluate the second-round pass through of oil prices to underlying inflation, I have estimated modified versions of some of the RBA's inflation models. This includes the mark-up model described in Ballantyne et al (2019), as well as the mark-up model and Phillips curve models described in Cassidy, Rankin, Read and Siebold (2019). The main modification to these models was the inclusion of lagged growth of Brent crude oil prices (in AUD). The results shown in the article (Graph 2) are the average of the estimates from these three models.

I have set also up a number of other equations for the explanatory variables in these models. Import prices and inflation expectations respond to changes in oil prices, while most of the other inputs were assumed to be exogenous.

Pass through to inflation expectations

The response of inflation expectations to the change in oil prices as shown in the article (Graph 2) is an average across a range of measures. For each of these measures, inflation expectations are estimated as a weighted average of:

- the mid-point of the RBA's target band
- lagged inflation expectations
- actual inflation over the past year, and
- year-ended growth of Brent oil prices in AUD.

Specifically, the response of inflation expectations to changes in oil prices are estimated using the following equation:

$$\pi_t^* = \beta_1\, 2.5 + \beta_2 \pi_{t-1}^* + \beta_3 \pi_{t-1} + (1 - \beta_1 - \beta_2 - \beta_3) \sum_{i=1}^{4} \Delta oil_{t-i} + \sum_{i=1}^{4} \alpha_i \mathrm{GST}_{t-i}$$

Where:

π^* = inflation expectations

π = year-ended headline inflation

oil = log of Brent crude oil prices in AUD

GST = dummy variable equal to 1 in Q3 2000

The coefficients are restricted to be non-negative and sum to one.

Most of the inflation expectations measures were estimated to not be directly affected by oil price growth. In these instances, the responses of expectations occurred only indirectly through the effect of oil prices on actual inflation.